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NOTICE OF ENTITLEMENT

We, **DUX ENGINEERS LIMITED**, of 6-8 Laery Street, Lower Hutt, New Zealand, being the applicant in respect of Application No. , state the following:-

- (a) **Ross Ernest CHRISTIE**, of 65 Queens Grove, Lower Hutt, New Zealand, and **Lyndsey Herbert BROWN**, of 53 Pekanga Road, Lower Hutt, New Zealand are the inventors and the details of the nominated person's entitlement to the grant of a patent are as follows:-

(i) The nominated person would, on the grant of a patent on the Application, be entitled to have the patent assigned to it.

- (b) We are entitled to claim priority as follows:

(ii) we are the applicants in respect of the basic applications listed on the patent request form.

- (d) The basic convention applications were the first made in a convention country.

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Dated 9 May 1991



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Our Ref: #7093 PS:WB 31dux

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Patents Act 1990

**COMPLETE SPECIFICATION
FOR A STANDARD PATENT**

ORIGINAL

Name of Applicant: **DUX ENGINEERS LIMITED**

Actual Inventor(s): **Ross Ernest CHRISTIE and Lyndsey Herbert BROWN**

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Invention Title: **DUAL FLUSHING MECHANISM AND FLUSHING
MECHANISM SUPPORT PLATE**

The following statement is a full description of this invention, including the best method of performing it known to us:

Our Ref: #7093 PS:WB 31dux

The present invention relates to a dual flushing mechanism for use in a toilet cistern and a mounting arrangement for a flushing mechanism.

5 The applicant's co-pending application number 27342/88 describes a dual flushing mechanism including a cup which may be selectively tipped to alter the weight acting downwardly to effect closure of the valve. For a part flush cycle the cup is filled with water and the valve actuated by lifting of a tube
10 connected to the float. As the water level lowers the weight of the water in the cup starts to act downwardly on the valve and effects closure of the valve after only part of the water in the cistern has been discharged.

15 To effect a full flush an arm with a weight on the end thereof is pivoted over one edge of the cup to tip the cup and empty the contents of the cup when the tube is lifted. In the full flushing cycle only the weight of the cup, tube and float acts downwardly on the valve and so a normal flush is effected
20 discharging substantially all the contents of the cistern.

25 The actuation means for this mechanism were affixed to the lid of the cistern. It has been found in use that when installing the cistern against a non-flat surface, due to the flexibility of the plastics material, the components of the mechanism may move out of alignment. Thus the tipping member may not swing over the top of the cup to effect the tipping thereof. This results in all

flushes being "half flushes". Having the actuation means secured to the lid also has the disadvantage that a plumber cannot see the cistern operating with the lid off.

5 This mechanism also suffered from the disadvantage that the water level at closure for a half flush was dependant upon the weight of water in the cup. Thus the amount of water delivered in a half flush was variable. Further, this mechanism did not allow reflushing immediately after a half-flush as the cup was still full of water and forced the valve closed.

10 It is an object of this invention to provide an improved dual flushing mechanism, or to at least provide the public with a useful choice.

Further objects of this invention will become apparent from the following description.

15 According to the invention there is provided a dual flushing mechanism for a toilet cistern comprising:

a valve means adapted to control the passage of a fluid therethrough, including a tube which when lifted opens the valve means;

20 a bell supported on said tube, and

a release means for selectively allowing air into the bell, wherein for a part flush the release means is not operative so that the lowering fluid in the cistern draws the bell down by suction to effect premature closure of the valve means due to the downward force exerted on the tube by the



bell, and wherein for a full flush the release means is operative to allow air into the bell to prevent a vacuum forming in the bell and so prevent premature closure.

According to a preferred form of the present invention the
5 release means comprises an arm which may be positioned over an edge of the bell so as to tip the bell when the tube is lifted and thus create an air gap at the top of the bell.

Further aspects of this invention, which should be considered
in all its novel aspects, will become apparent from the
10 following description given by way of example of a possible embodiment thereof in which reference is made to the accompanying drawings wherein:

Figure 1: shows a functional diagram of a dual flush mechanism according to the present invention shown in partial section.



Figure 1a: shows a perspective view of the bell shown in figure 1.

5 Figures 1b to 1e: illustrate the operation of the dual flush mechanism for a half flush.

Figures 1b and 1f to 1h: illustrate the operation of the dual flush mechanism for a full flush.

10 Figure 2: shows the preferred form of actuating mechanism mounted on a mounting plate.

Figure 3: illustrates the operation of the tipping member.

15 Figure 4: shows a frontal view of the tipping member shown in figure 3.

Figure 5: shows the cradle which connects to the top of the valve tube.

20

Figure 6: shows the preferred form of actuation lever for lifting the valve tube by the cradle shown in figure 5.

25 Figure 7: shows the preferred form of flushing mechanism in perspective.

Referring to figure 1 a functional diagram of the dual flushing mechanism of the present invention is shown. A valve means is

provided by float 1 which may seal against outlet 2. In the position shown in figure 1 the float seals against outlet 2 to prevent the flow of fluid there through. Connected to float 1 is a tube 3 which when lifted raises float 1 to allow fluid to flow out of outlet 2.

Rings 4a and 4b are affixed to tube 3 and bell 5 is retained there between. Bell 5 is preferably of substantially conical form and has an open base. Bell 5 may be provided with a raised ring 5a to provide a flat surface for arm 6 to engage. Arm 6 may be provided with a projection to engage with ring 5a. Ring 5a may be supported by a plurality of pillars 5b with gaps 5c there between.

Depression of button 7 causes member 8 to rotate about pivot 9 to lift cradle 10 and tube 3 to raise float 1. Depression of button 11 rotates member 17 about pivot 18 to lift cradle 10 and thus raise float 1 via tube 3. At the same time button 11 rotates member 12 about pivot 13 so that portion 14 of member 12 acts downwardly on member 15. This causes arm 6 to rotate anticlockwise about pivot 16 and move arm 6 away from bell 5. Once button 11 is released weight 19 acts to return arm 6 to its initial position.

Referring now to figures 1b to 1e in conjunction with figure 1 the operation of the mechanism of the invention to effect a half flush will be described.

Figure 1b illustrates the mechanism in its normal state. Float 1 is sealed against outlet 2. Bell 5 rests upon ring 4a. Arm 6 is positioned over raised ring 5a of bell 5 and the water level is at level 50.

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Upon depression of button 11 arm 6 swings away from the edge of bell 5 and tube 3 is lifted to initiate flushing as shown in figure 1c. Once button 11 is released arm 6 swings back and rests against the edge of bell 5 (see figure 1d). Bell 5 rests on top of ring 4a and a seal is formed by the capillary action of the water between the two surfaces. As the water level lowers the fluid within the bell cannot escape as no air can enter to replace its volume. Accordingly a vacuum is formed in the bell (the word "vacuum" is used in this context to refer to a partial vacuum). As the water level lowers further the column of water below the bell draws the bell down by suction to apply a downward force on the float 1 via tube 3. Once the downward force reaches a given level the float 1 is forced down against outlet 2 to prematurely close the valve means as shown in figure 1e. Weight 19 acts to return the arm to its initial position.

25
Referring now to figures 1, 1b and 1f to 1h a full flush will be described. To effect a full flush button 7 is actuated. This raises tube 3 whilst leaving arm 6 positioned over an edge of bell 5. Consequently, as tube 3 lifts float 1 bell 5 is tipped by arm 6 as shown in figure 1f. This allows air to enter between the gap 51 between the bell 5 and tube 3. This allows the fluid

within the bell to escape without maintaining a vacuum in the bell. Bell 5 remains tipped after button 7 has been released as tube 3 and float 1 remain raised (figure 1g).

- 5 At this point, as shown in figure 1g, the water has all escaped from within the bell and there is no vacuum to couple the column of fluid and the bell. Thus the column of water does not draw the bell down by suction as for the half flush.
- 10 The water level continues to fall until it reaches the level shown in figure 1h whereupon float 1 closes against outlet 2 in the normal way and the cistern refills. As the cistern refills fluid displaces the air within the bell.
- 15 The mechanism of the present invention allows precise closure of a valve means as closure is effected at a predetermined water level rather than by a weight, which may vary, overcoming the resistance to closure of a valve means. The mechanism of the present invention also has the advantage that it allows
- 20 reflushing before the cistern refills.

The mechanism may be arranged so that when button 11 is depressed arm 6 swings out of the way of bell 5 slightly before tube 3 is raised. In this way there is less chance that arm 6 would

25 accidentally engage with the edge of bell 5.

It is to be appreciated that other means for selectively admitting air to the bell may be employed. It may be appropriate

to control the admission of air to the bell by a valve.
It is also to be appreciated that the amount of fluid released for a half flush may be varied by raising or lowering ring 4a.

5 Referring now to figure 2 a top view of a flushing mechanism provided on a mounting plate is shown. Mounting plate 20 is provided with grooves 21, 22 (on the underside) adapted to engage with the top front and top rear edges of a toilet cistern. It is advantageous to have the mechanism mounted in this way so that
10 firstly, the relative positions of the components of the mechanism are fixed relative to one another and, secondly, that this enables a plumber installing the cistern to observe the operation of the cistern with the lid off.

15 Member 23 corresponds to member 8 in figure 1 and pivots about pivot bar 24 to lift cradle 25 when actuated by the depression of button 26 (shown in dashed outline only). Member 27 corresponds to member 17 in figure 1 which pivots about pivot bar 28 to raise cradle 25 when button 29 is depressed. Member 30 corresponds to
20 member 12 in figure 1 and pivots about pin 31 when depressed by button 29 (shown in dashed outline only). Member 27a (shown in dashed outline) may be used when only single flush operation is required.

25 Referring now to figure 3 the preferred actuating means for the tipping member is shown. Member 30 pivots about pin 31 so that when downwardly depressed knob 32 is forced against surface 33 which causes tipping member 34 to rotate in the direction of

arrow B about pivot bar 35. When the button is released weight 36 causes tipping member 34 to rotate back to its normal position. When tube 3 is lifted the edge of a bell 5 abuts against blade 37 of tipping member 34 and forces it upward against member 30. Member 30 is however restrained by button 29. Preferably the mechanism will be arranged so that tipping member 34 is pivoted to one side slightly before the tube is lifted to ensure that tipping member 34 is well out of the way of cup 5 before it is lifted. The arrangement provides central loading and ensures reliable tipping of the cup.

Referring now to figure 5 the preferred form of cradle 39 is shown. The cradle is provided with apertures 40 to allow attachment of the cradle via a pin to the overflow tube. The cradle is also provided with an aperture 41 to engage with the actuation means.

Referring now to figure 6 the preferred form of actuating member 27 or 23 is shown. Actuating member 23 is provided with a v-shaped recess 42 having a circular portion at its apex. Member 23 pivots about pivot bar 24. Actuating member 23 is provided with a hook 43 adapted to engage with recess 41 in cradle 39. Pivot bar 24 is integrally formed with the mounting plate. Depression of button 26 causes rotation of actuation member 23 about pivot 24 to lift a cradle 39 engaged with hook 43. The components of the present invention are preferably formed of plastics except for the weight 36 which may be formed of brass.

Where in the foregoing description reference has been made to integers or components having known equivalents then such integers are herein incorporated as if individually set forth.

5 Although this invention has been described with reference to a possible embodiment thereof it is to be appreciated that improvements and or modifications may be made to the invention without departing from the scope of the invention as defined in the appended claims.

The claims form part of the disclosure of this specification.

THE CLAIMS DEFINING THIS INVENTION ARE AS FOLLOWS:

1. A dual flushing mechanism for a toilet cistern comprising:
a valve means adapted to control the passage of a fluid therethrough, including a tube which when lifted opens the valve means;
a bell supported on said tube; and
a release means for selectively allowing air into the bell, wherein for a part flush the release means is not operative so that the lowering fluid in the cistern draws the bell down by suction to effect premature closure of the valve means due to downward force exerted on the tube by the bell, and wherein for a full flush the release means is operative to allow air into the bell to prevent a vacuum forming in the bell and so prevent premature closure.
2. A dual flushing mechanism as claimed in claim 1 wherein the release means comprises an arm which can be selectively positioned over an edge of the bell to tip the bell when the tube is lifted.
3. A dual flushing mechanism as claimed in claim 2 wherein the arm is provided with a counter-weight which biases the arm towards the edge of the bell.
4. A dual flushing mechanism as claimed in claim 1 wherein the release means is a valve means which selectively admits air into the bell.

5. A dual flushing mechanism as claimed in claim 2 or 3 wherein a first button is provided which when depressed lifts the tube to open the valve means and a second button which when actuated lifts the tube to actuate the valve means and also
5 swings the arm away from and clear of the bell.

6. A dual flushing mechanism as claimed in any one of the proceeding claims wherein the bell is substantially conical in shape with an open base and circular aperture at the apex thereof, the tube passing through the circular aperture in the
10 bell with the bell being supported by a ring about said tube.

7. A dual flushing mechanism as claimed in claim 6 wherein the bell is provided with a raised ring on the upper outside edge thereof.

8. A dual flushing mechanism substantially as hereinbefore
15 described with reference to the accompanying drawings.

DATED this 31 March 1993

CARTER SMITH & BEADLE

Fellows Institute of Patent Attorneys of Australia

Patent Attorneys for the Applicant:

DUX ENGINEERS LIMITED



ABSTRACT

A dual flushing mechanism for a toilet cistern comprises a valve means in the form of a float (1) which seals against an outlet (2). A tube (3) is connected to the float whereby lifting of the tube breaks the seal and opens the valve means. A bell (5) is supported on the tube and release means (6) selectively allows air into the bell when a full flush button (7) is pressed. The release means is inactive when a part flush button (11) is pressed. For a part flush lowering of water in the cistern draws the bell down by suction to prematurely close the valve means whereas for the full flush the air entering the bell prevents a vacuum forming and so prevents premature closure.

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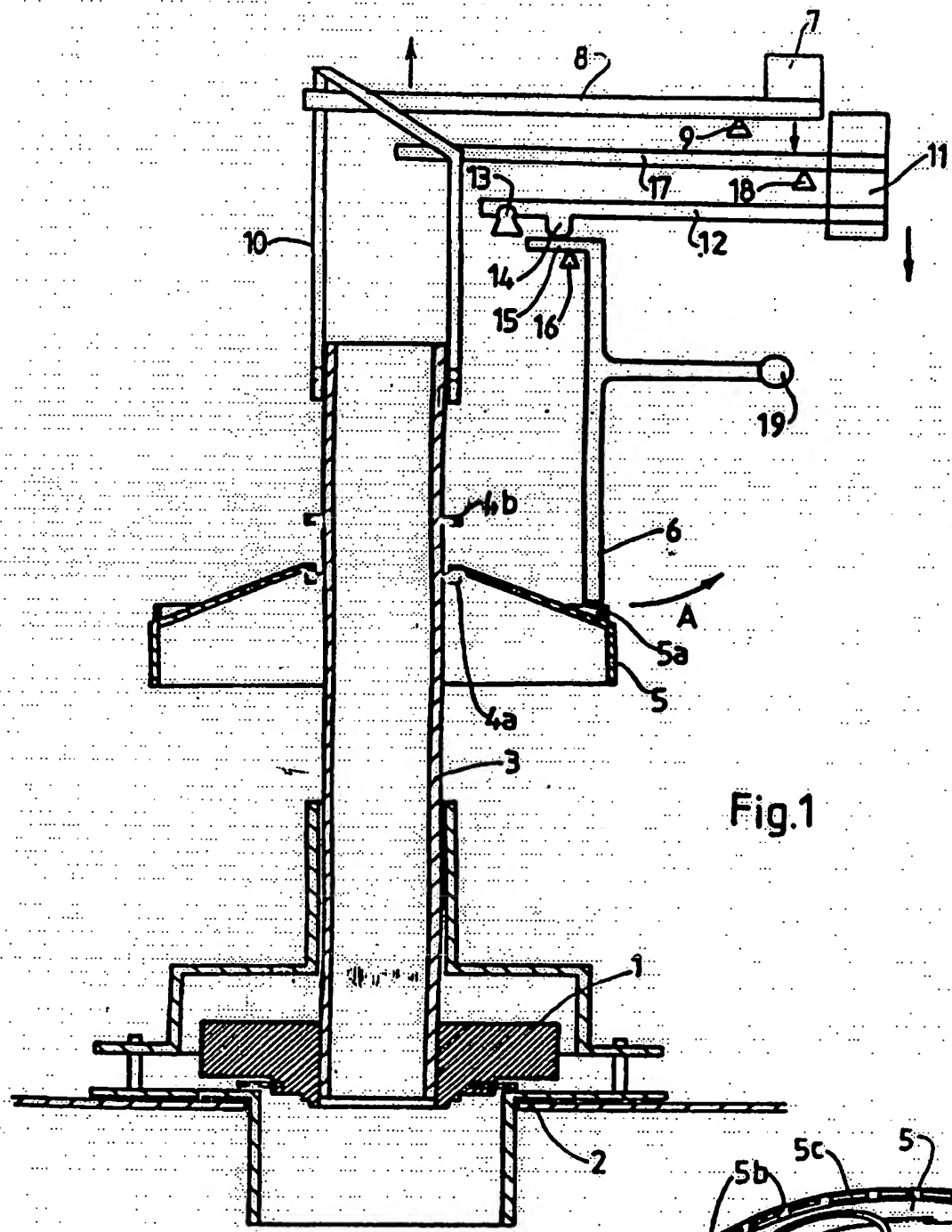
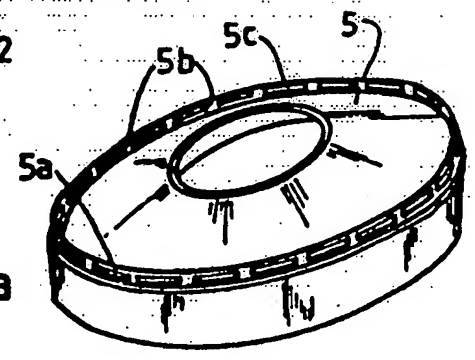
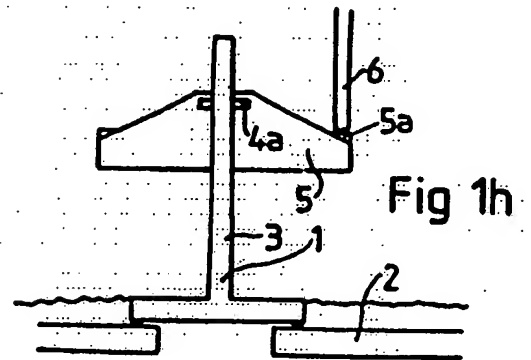
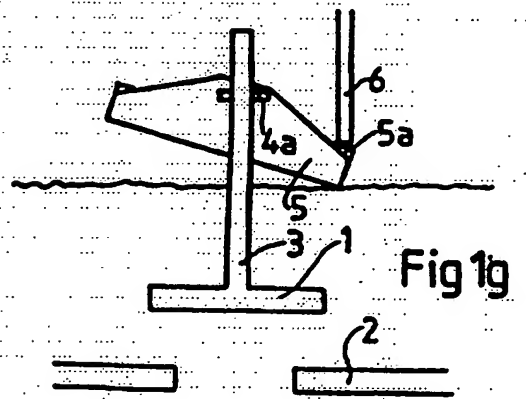
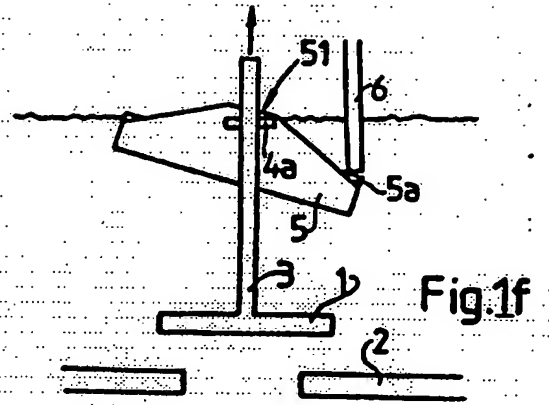
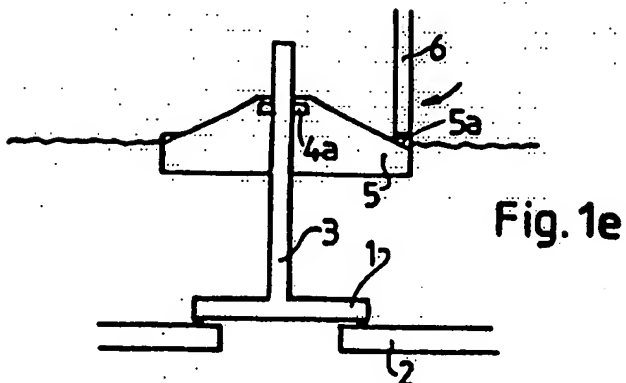
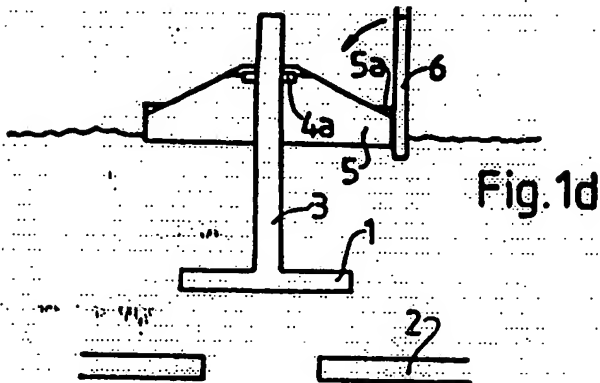
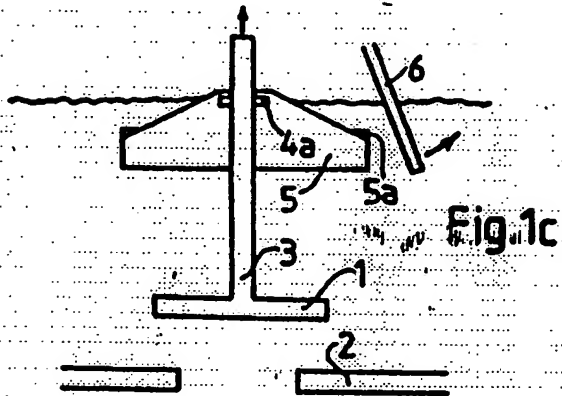
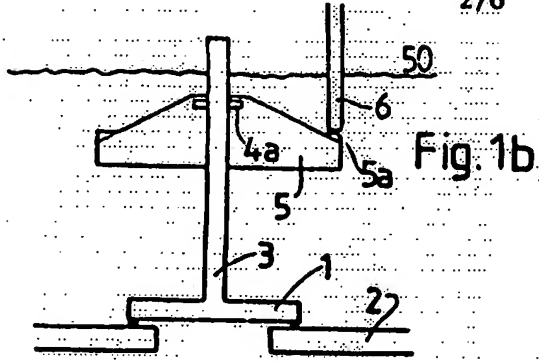


Fig.1

Fig.1a





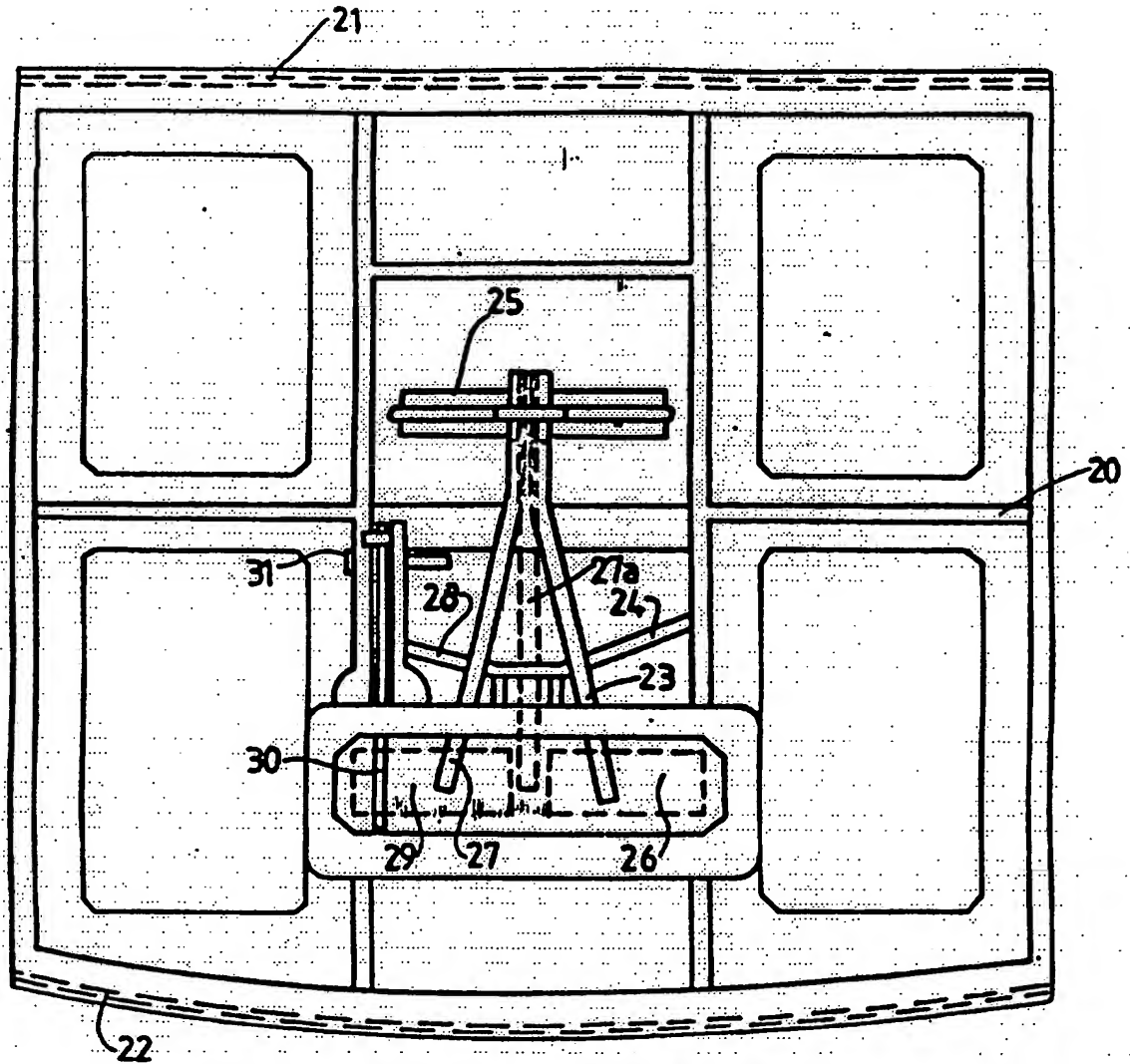


Fig. 2

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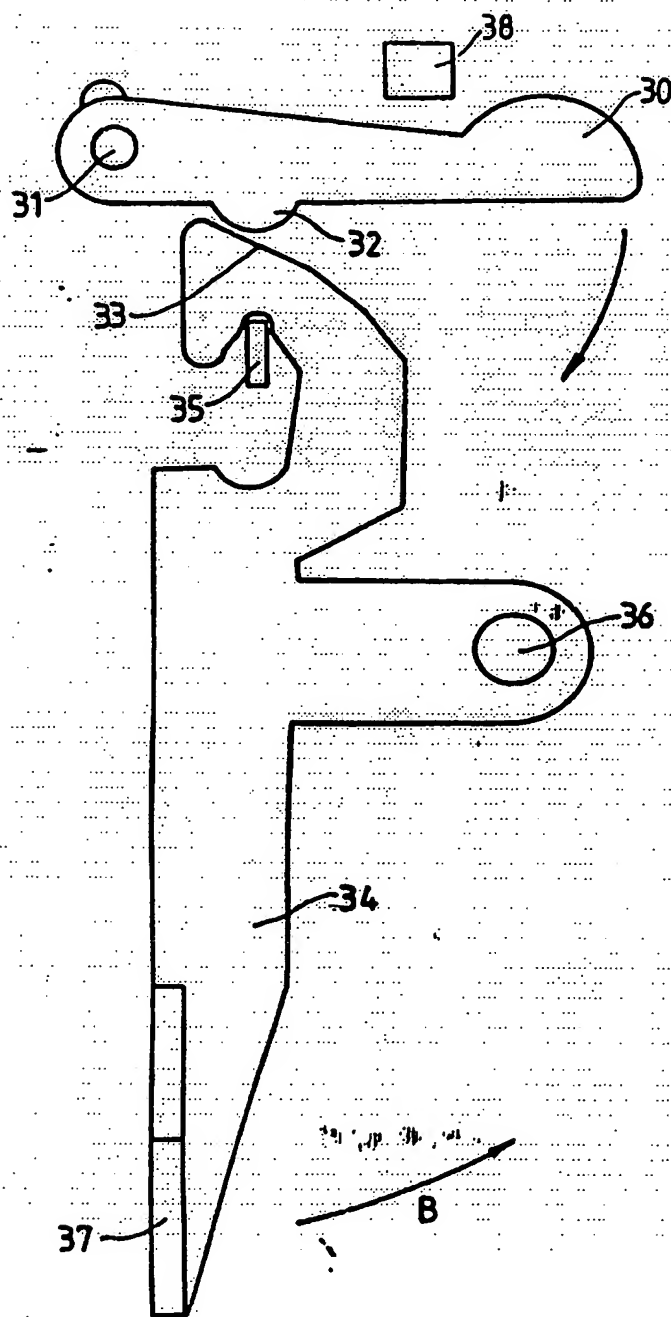


Fig. 3

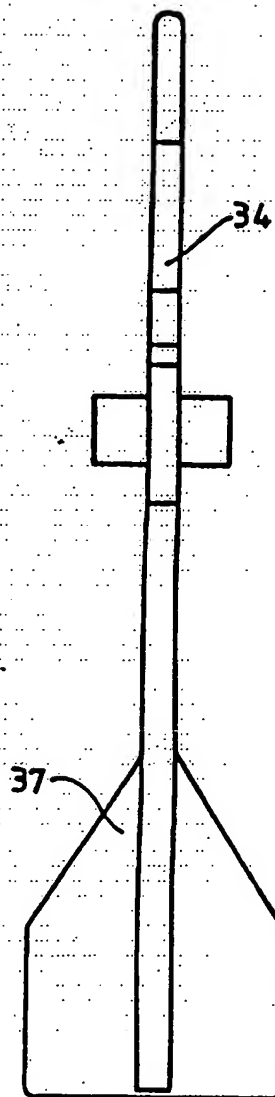


Fig. 4

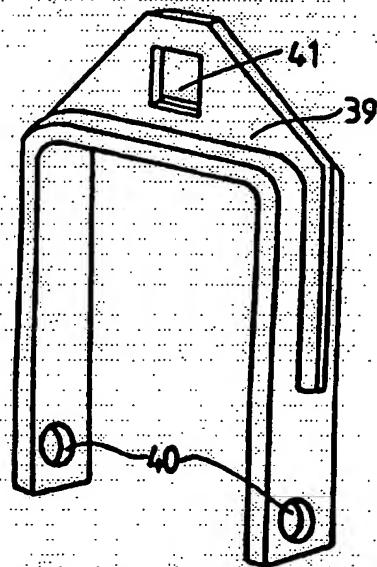


Fig. 5

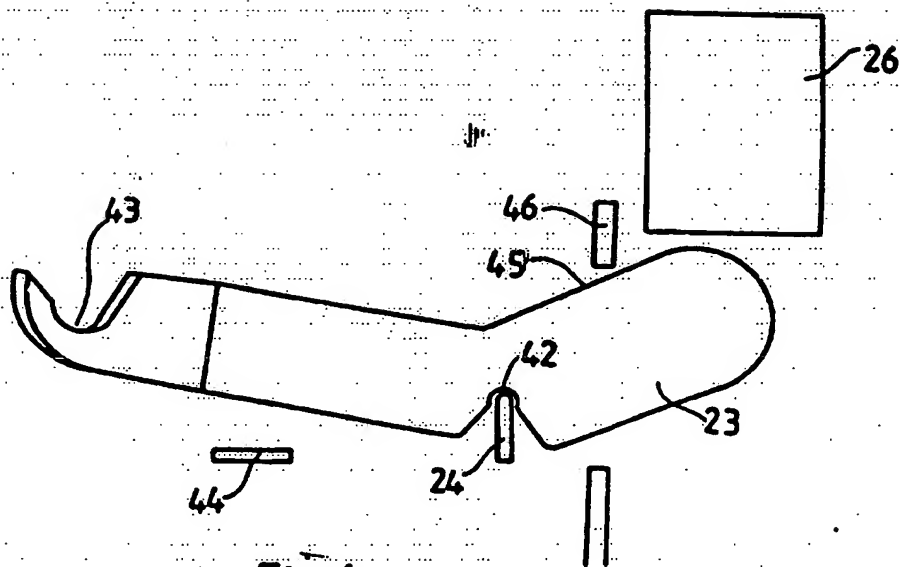


Fig. 6

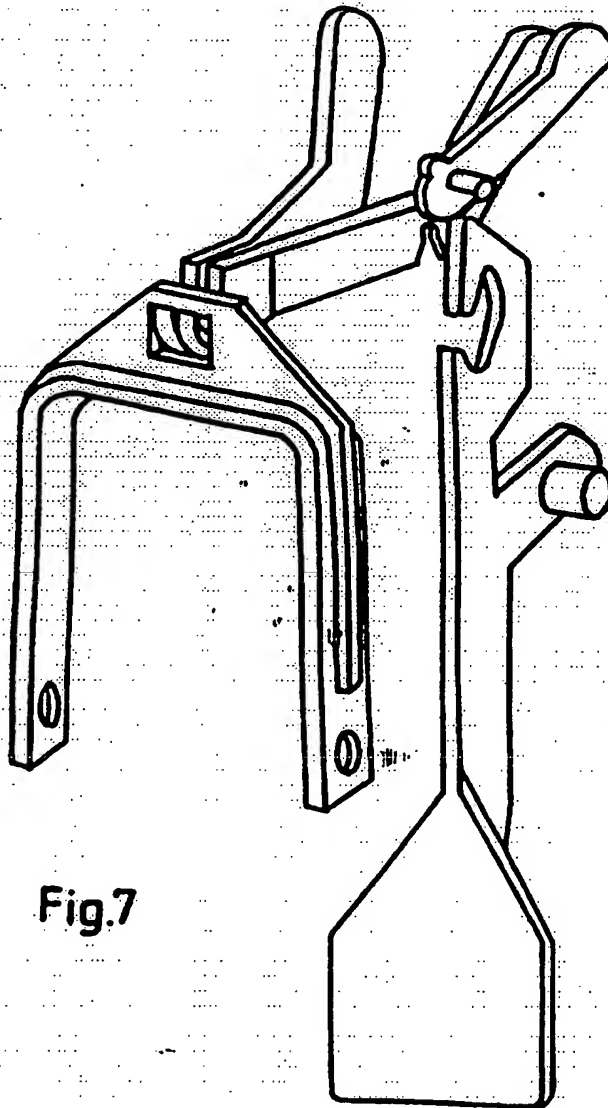


Fig. 7

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